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AUTHOR	Casady, Angela; Diener, Marissa; Isabella, Russell; Wright, Cheryl
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ABSTRACT

This study examined the relationship of multiple domains of the child's environment and attachment security within a socioeconomically at-risk sample of 101 families. Mothers--65% percent of whom were Latina--and their children who were in a home visitor program or on the waiting list for the program were visited at home. Measures included observer assessments of maternal sensitivity, mother sorts of the Attachment Q-Set, the Parenting Stress Index, a questionnaire on beliefs about parental involvement in children's learning and parental efficacy, and a measure of children's learning environments. Findings indicated that maternal, child, and contextual variables were significantly associated with attachment security. Lower levels of maternal sensitivity, difficult child temperament, parental stress, and an inadequate supply of play materials in the home were related to lower levels of attachment security. The provision of play materials in the home mediated the relationship between maternal sensitivity and attachment security. (Author/HTH)

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Angela Casady, Marissa Diener, Russell Isabella, and Cheryl Wright

Paper presented at the 2001 Biennial Meeting of the Society for Research in Child Development (Minneapolis, MN, April 19-22, 2001).

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Attachment Security Among Families in Poverty:

Maternal, Child, and Contextual Characteristics

Conference of the Society for Research in Child Development, Apr. 19-22, 2001

By Angela Casady, Marissa Diener, Russell Isabella, and Cheryl Wright

This study examined attachment security in a low socioeconomic status (SES) sample of families (n = 101). Mothers (65% Latino) and their young children who were in a home visitor program (n = 74) or on the waiting list (n = 27) for the program were visited at home. Measures included observer assessments of maternal sensitivity, mother sorts of the Attachment Q-Set, the Parenting Stress Index, a questionnaire on beliefs about parental involvement in children's learning and parental efficacy, and a measure of children's learning environments. Results indicated that maternal, child, and contextual variables were significantly associated with attachment security.

In a commentary on research investigating child outcomes in high-risk families, it is noted that risk factors do not occur in isolation (Seifer, 1995). For example, parents who are not responsive to their infants may also be depressed. Such parents may have many other risk factors, such as low socioeconomic status, a lack of self-efficacy, high stress, and low social support. The combined effects of multiple risks tend to explain much more variance in child outcomes than each of the effects individually.

Although most previous work has not examined attachment in the context of the total environment, the present study examined the relationships of multiple domains of the child's environment and attachment security within an at-risk sample. Maternal characteristics, including sensitivity, maternal depression, and self-efficacy, should have a direct effect on the mother-child relationship (Teti & Gelfand, 1991). Aspects of the

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environment, such as social support, marital support, socioeconomic status, and parental stress may indirectly affect the mother-child attachment (Belsky & Isabella, 1988; Lyons-Ruth, 1992a). Theoretically, child characteristics, such as temperament or child gender, could also affect attachment quality (Barnett, Kidwell, & Leung, 1998; Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990). Factors from each of these domains were examined within the context of this study.

Maternal Characteristics

Sensitivity. Ainsworth discussed the process of caregiver sensitivity and its relationship to attachment at length in her report of the Baltimore longitudinal study (Ainsworth et al., 1978). In her earlier work Ainsworth had noted that young infants are most likely to be soothed if mothers pick up their crying infants (Bell & Ainsworth, 1972). Mothers of secure infants were more accepting, sensitive, cooperative, and psychologically accessible to their infants than mothers with insecure infants (Ainsworth et al.). Securely attached infants' mothers responded to their cries more quickly and appropriately than mothers of insecurely attached infants.

Results from a group of longitudinal studies revealed the importance of measuring the appropriateness of maternal behavior rather than simple frequency of response, further defining the relationship between sensitivity and attachment quality (Belsky, 1999). Mothers of insecure-avoidant infants had the highest frequency of response on a measure of attention, vocalization to the infant, expression of affection, and infant stimulation. Secure infants received an intermediate amount of responsive attention; mothers of insecure-resistant infants had the lowest frequency of responsive

attention. Thus, response to infants may result in insecure attachment when it is intrusive or otherwise inappropriate.

Goldsmith and Alansky (1987) performed a meta-analysis of 13 studies involving constructs of sensitivity and attachment quality. They concluded that there was indeed a significant association between sensitivity and attachment security in most of the studies; however, the relationship between sensitivity and attachment security was weaker than Ainsworth's study had demonstrated. A more recent meta-analysis of 66 studies also indicated a significant correlation between maternal sensitivity and attachment quality. They found a correlation of $r = .20$ when combining 21 studies using the strange situation in nonclinical samples (De Wolff & van IJzendoorn, 1997).

Other researchers have questioned De Wolff and van IJzendoorn's estimate of the correlation between sensitivity and attachment (Cowan, 1997; Pederson, Gleason, Moran, & Bento, 1998; Thompson, 1997; van den Boom, 1997). One problem with the estimate of correlation may be the quality of measurement of sensitivity among the studies analyzed in the van IJzendoorn meta-analysis. Ainsworth's original rating scale required highly trained observers to make immediate judgments regarding the mother-child interaction. Although the actual correlation between sensitivity and attachment is probably lower than .78 as measured by Ainsworth, the correlation of .20 measured by De Wolff and van IJzendoorn may be attenuated by measurement error in measuring sensitivity. Two studies utilized home observation and measurements of maternal sensitivity that reflect reciprocal and synchronous responsive behavior (Isabella, 1993; Pederson & Moran, 1996). Correlations between maternal sensitivity and attachment in these studies were equal to or greater than 0.5.

De Wolff and van IJzendoorn's paper (1997) also addressed an attenuation of the predictive effect of maternal sensitivity on attachment among clinical and low-income samples. They suggest that multiple risk factors, such as poor living conditions or family violence, may diminish the impact of a sensitive maternal figure on mother-child attachment. A second possibility is that sensitivity may act as a buffer that mediates the effects of family variables on attachment quality (Cowan, 1997). The current study will test various aspects of these two conflicting hypotheses: a) sensitivity acts as a buffer that mediates the effect of various aspects of the environment on attachment, and b) the environment reduces the relationship between maternal sensitivity and mother-child attachment.

Maternal depression. Clinical depression, particularly severe depression, is associated with insecure attachment (Teti, Gelfand, Messinger & Isabella, 1995). A number of empirical studies have examined the association between clinical and nonclinical samples, and there appears to be a fairly reliable association between both bipolar and unipolar depression and insecure attachment (Cohn & Campbell,1992; Lyons-Ruth, Connell, Grunebaum, & Botein, 1990; Lyons-Ruth, 1992a; Murray, Fiori-Cowley, Hooper, & Cooper, 1996; Radke-Yarrow, 1991).

It is of interest that the Lyons-Ruth project began as a study of risk factors for low-income families. Later, it was discovered that 74% of the high-risk mothers referred to the intervention and 27% of the control group met criteria for a diagnosis of clinical depression (DSM-III-R). Security of attachment at 18 months was associated with lower scores on the Center for Epidemiological Studies Depression Scale (CES-D). Home observations at 12 and 18 months indicated that increased hostile and intrusive

behavior towards the infant was related to maternal depression. A review of maternal depressive symptoms and infant-mother attachment relationships indicates that maternal depressive symptoms, such as negative affect, combined with stressful situations is more likely to result in insecure attachment than an actual diagnosis of an affective disorder (Lyons-Ruth, 1992b).

Parenting efficacy. Bandura's self-efficacy theory states that individuals' beliefs about the connection between their efforts and the desired outcomes affect their motivation to act (Bandura, 1982). Bugental & Shennum (1984) applied self-efficacy theory to the parenting relationship. Parental efficacy was defined as a level of perceived control over parenting situations.

Studies of parental efficacy have defined the construct in many different ways. One definition of parental efficacy involves the concept of locus of control (Campis, Lyman, Robert, & Prentice-Dunn, 1986; Luster & Kain, 1987). External locus of control refers to the belief that outcomes are a matter of fate or chance. Internal locus of control relates to the belief that one is responsible for life outcomes. Parents who believe that their children are not responsive to parenting would be said to have an external locus of control. Theoretically, such parents would be less likely to invest time in effective parenting practices, thus increasing the likelihood of insecure attachment.

Two studies of children and parents showed that self-efficacy mediated the negative relation between depression and maternal responsiveness (Gondoli & Silverberg, 1997; Teti & Gelfand, 1991). In these studies, efficacy was viewed as the parents' personal views of their own effectiveness on specific items, such as soothing the baby, understanding what the baby wants, and knowing what the baby enjoys. A

discussion of the theoretical basis of parental efficacy as a mediator between maternal responsiveness and depression relies on evidence from studies from studies of parenting special-needs children, e.g., low birthweight and developmental delay (Teti, O'Connell, & Reiner, 1996). Mothers with strong self-efficacy beliefs are less likely to experience maternal depression. Mothers with higher self-efficacy are also more likely to be responsive and engaged when observed interacting with their infants. The negative relation between maternal depressive symptoms and maternal sensitivity is substantially reduced when maternal self-efficacy beliefs are statistically controlled. Apparently, the sense of helplessness that often accompanies depression is linked to a lack of maternal responsivity. Thus, parental efficacy may be important in determining parenting behavior.

Self-efficacy theory and attachment theory formed the basis for an intervention directed at changing parenting behaviors in an at-risk sample of low-income mothers (Olds, 1997). The effect of the program on child maltreatment in the first 2 years was moderated by the mother's prenatal self-efficacy. Mothers who had high self-efficacy and participated in the program were less likely to be reported for child abuse or neglect than mothers who had low self-efficacy or were not in the program. The interaction of self-efficacy and program results is a moderating effect. Program effects on emergency room visits in the first 2 years were also moderated by mothers' self-efficacy. Mothers who had high self-efficacy and participated in the program had a lower number of emergency room visits than mothers who only participated in the program or only had high self-efficacy.

According to Olds, one limitation of parental efficacy theory in an intervention setting is the assumption that parents are neglectful because they do not believe they can be effective. Low-income parents may be neglectful because of adverse environmental conditions, stress, or depression. Previous efforts to change their behaviors or circumstances may have met with resistance, thus teaching them low self-efficacy by experience. Yet, without an initial belief in the importance of parenting efforts, it may be difficult to improve parenting behavior.

Two studies indicate a positive relationship between parental efficacy and attachment quality (Donovan & Leavitt, 1989; Spieker & Booth, 1988). One of these studies found that parental efficacy tended to predict the type of attachment (secure, avoidant, resistant, or disorganized) in an at-risk sample (Spieker & Booth). Mothers with secure infants reported significantly more confidence in coping with motherhood tasks than did mothers with insecure-resistant infants. Mothers with avoidant and disorganized infants were much more confident than either mothers with insecure-resistant infants or mothers with secure infants. Earlier research indicates that avoidant mothers tend to be over-controlling (Isabella, Belsky, & von Eye, 1989). The relationship between avoidant-insecure attachment, insecure-resistant attachment, and mother's perceived self-efficacy could be explained by the notion that over-controlling mothers may have a false impression of their own competence.

Another indication that parental efficacy is important to the study of mother-child attachment lies in the theory of dyadic relationships with disorganized attachments (Solomon & George, 1999a). Mothers who have abdicated caregiving are characterized as experiencing helplessness. Psychological problems, severe daily stress, or traumatic

events may induce feelings of helplessness and vulnerability. The subsequent state of panic makes mothers insensitive to the child's cues. In addition, frightened behavior, such as frightened facial expressions, freezing, disorientation, or aggression, are frightening to the infant. The child's desire to seek protection from the mother is blocked. Thus, in extreme cases of maternal helplessness, the attachment system is disabled.

Maternal Education. This study was unique in that a large percentage of the sample (65%) was of Latino origin. Educational opportunities may be a significant factor in explaining differences between Latino and non-Latino participants. Previous research indicates that Latino mothers with levels of education similar to that of Anglo-American mothers did not significantly differ from Anglo-American mothers in their style of teaching (Laosa, 1980). Without controlling for education, Latino mothers had more negative maternal teaching strategies than Anglo-American mothers. Families with lower levels of education and income are less likely to hold beliefs about the importance of parental involvement to child development (Luster & Kain, 1987). Thus, although a lack of maternal education may be associated with insecure attachment, the stresses of poverty and lack of knowledge about child development that often accompany a lack of education may represent more direct pathways to insecure attachment.

In summary, maternal characteristics are associated with the quality of the mother-child relationship. Maternal responsiveness tends to be related to secure mother-child attachment. Maternal depression appears to limit maternal sensitivity and is associated with higher rates of insecure mother-child attachment. Parental efficacy,

when measured as locus of control, is associated with secure attachment. Yet, parental self-esteem or perceived competence has differential effects on attachment security. The present study examines the associations among maternal characteristics--sensitivity, depression, education, efficacy--and attachment security among families in poverty.

Child Characteristics

A second line of research investigates the impact of the child on attachment quality. The attachment behavioral system is reciprocal in nature; therefore, the child's contribution to the relationship may theoretically affect attachment quality. Specifically, temperament is theorized as a contributor to mother-child attachment.

The relationship between attachment and temperament has been debated extensively. Sroufe (1985) theorized that temperament is not related to security of attachment. He cites evidence such as differing attachment classifications with different caregivers and changing attachment classification as a result of changing caregiver characteristics. Thus, according to Sroufe, a constant trait such as temperament could not significantly affect Strange Situation classification, which measures aspects of the caregiver-child relationship. Other theorists suggested early in the debate that classification in the Strange Situation procedure is dependent on the inherent temperament of the child (Kagan, 1982).

Empirical studies of the direct relationship between infant temperament and attachment result in mixed findings (Goldsmith & Harmon, 1994), with some studies documenting an association and others finding no association. However, a number of studies that have examined attachment security using Waters' (1995) Attachment Behavior Q-Set (AQS) found moderate correlations between difficult temperament and

less secure attachment relationships (Hadadian & Merbler, 1996; Seifer, Schiller, Sameroff, Resnick, & Riordan, 1996; Teti, Nakagawa, Das, & Wirth, 1991). Seifer et al. utilized mother reports and observational measures of infant temperament. Observation measures of negative mood and total difficulty were both associated with low scores on the Attachment Q-set (AQS), indicating insecure attachment.

Teti et al. (1991) used scales on the Parenting Stress Index to assess various aspects of child temperament. High scores on the child domain were strongly related to low security as measured by the Attachment Q-Set. Related subscales measuring various aspects of temperament include adaptability, demandingness, mood and distractibility. High scores in these areas, indicating low adaptability, demanding infants, negative mood and distractible or hyperactive infants, predicted low attachment security.

Some aspects of the relationship between temperament and attachment remain unresolved. Yet, researchers have found direct and indirect relationships between various attachment measures and negative mood, fearfulness, emotionality, proneness-to-distress, and sociability. Recently, a growing consensus has developed that both caregiver influences and child functioning are expressed in attachment-related behavior (Kochanska, 1998). By including several aspects of the child's environmental system, the present study may clarify relationships among maternal sensitivity, maternal depression, temperament, and attachment security.

Contextual Characteristics

For the most part, studies have focused on maternal and infant contributions to the dyadic relationship, ignoring contextual characteristics of the family (Belsky &

Isabella, 1988). Yet, Bronfenbrenner's (1979) focus on the total environment included cultural, socioeconomic, and parental social relationships as contributors to child outcome. Belsky's (1984) model of determinants of parenting also offered a theoretical basis for examining contextual relationships in the attachment framework. His model encompasses parent and child personality, developmental history, and contextual characteristics, such as social support, parental work environment, and marital relations. By exploring the major factors that affect attachment in a single study, a more realistic picture of human development can be obtained.

Social Support. Several studies have found a positive association between secure attachment and spousal support (Belsky & Isabella, 1988; Crnic, Greenberg, & Slough, 1986; Goldberg & Easterbrooks, 1984; Spieker & Booth, 1988; Teti et al., 1991). Crockenberg (1981) found that combined social and marital support was the most important predictor of attachment quality and moderated the effect of infant temperament. Low scores on Social Support and Partner Involvement, a measure combining social and marital support, were associated with disorganized attachment in an at-risk sample (Spieker & Booth).

Other studies measured spousal support and social support separately. The lack of spousal support has been found to have negative effects on child outcome when combined with other factors besides social support. For example, maternal depression combined with a lack of spousal support is more likely to result in child psychopathology than maternal depression combined with a supportive spouse (Cicchetti & Toth, 1990). Other significant relationships may provide emotional support and a sense of belonging that enhances maternal self-esteem and well-being. In one

study of an at-risk population, the number of people in a parents' social network as well as the number of supportive people in a parents' social network predicted the security of attachment in the mother-child relationship (Frodi et al., 1984). Most studies, however, have not found a direct association between social support, as defined separately from marital support, and mother-child attachment (for review see Berlin & Cassidy, 1999).

Parental Stress. Theoretically, stress may limit a parent's ability to respond to her child's needs. Stress may involve life events such as a husband's job loss or ongoing events such as a lack of economic resources. This, in turn, may affect the quality of attachment. A previously cited study found that stressful life events during the pregnancy period predicted insecure attachment (Murray et al., 1996). Further analysis indicated that two life events, chronic difficulty with the mother's own mother or a stressful birth experience, were responsible for the relationship between stress and attachment. Spieker and Booth (1988), however, found no direct association between attachment and long-term family stressors, such as having trouble finding a place to live, and attachment quality. These two studies utilized different life event scales that may not have had similar items.

Four additional studies of attachment and stress found significant relationships between types of parenting-related stress and attachment quality (Hadadian & Merbler, 1996; Jarvis & Creasey, 1991; Pederson et al., 1990; Teti et al., 1991). These studies utilized the Parenting Stress Index and sorts of the Attachment Q-Set. The long form of the Parenting Stress Index (PSI) consists of subscales in two domains, child-related stress, such as child mood and adaptability, and parent-related stress, such as spousal support and depression. Pederson et al. (1990) measured relations between parenting

stress and attachment among mothers of varying educational and socioeconomic backgrounds. Parent and child domains of the PSI were negatively related to mother and observer sorts of the Attachment Q-Set (AQS); thus, increased stress predicted insecure attachment. An additional study found that high scores on the child domain of the PSI, indicating child-related stress, predicted low scores on mother sorts of the AQS in a high-risk sample (Hadadian & Merbler).

The effects of poverty and multiple risk factors. The distribution of attachment classifications varies among socioeconomic classes. The rate of secure attachment among middle-class groups tends to lie between 65% and 75% (Ainsworth et al., 1978; Bell, 1970; Belsky, Rovine, & Taylor, 1984; Maslin & Bates, 1983). Studies observing lower class at-risk groups indicate a secure attachment rate near 55% (Egeland & Farber, 1984, Egeland & Sroufe, 1981; Frodi et al., 1984; Lyons-Ruth, Connell, Grunebaum, Botein & Zoll, 1984; Vaughn, Egeland, Sroufe, & Waters, 1979). In addition, Pederson et al. (1990) found a direct relationship between years of maternal education and security of attachment, implying a correlation with socioeconomic status. Thus, poverty may be associated with increased likelihood of insecure attachment.

One reason for this association may be the suboptimal physical environment that accompanies poverty. The effect of the physical home environment was examined in earlier studies (Wachs, 1990; Wachs & Camli, 1991). A study of 88 12-month-old infants and parents observed in their homes compared the effects of children's social and physical environment environment to mastery motivation (Wachs, 1990). The child's social environment was defined as parental behavior, such as the amount and nature of parent vocalizations, the amount and nature of parent responsivity to child vocalizations,

and the amount of adult showing, giving, or demonstrating objects to the child. The physical environment was defined as the amount of crowding, availability of objects, variety of objects and toys, and the conduciveness of the home environment to infant exploration. A laboratory task involved free and structured play situations, which were then coded into play styles assessing infant mastery motivation. Results of this study indicated that the physical home environment acted as a mediator on the relationship between the maternal behavior, e.g. maternal sensitivity, and child development. Further analysis of this data indicated that influences of parental behavior on child outcome dropped to nonsignificance after controlling for effects of the physical environment (Wachs & Camli, 1991).

Poverty is associated with multiple risks that may create a cumulative negative effect on the mother-child attachment relationship. Research on risk and resilience suggests that multiple risk factors often explain greater variance in child outcomes than any individual risk factor (Seifer, 1995). The concept of multiple risks affecting attachment quality is directly explored in two previously cited studies (Belsky & Isabella, 1988; Cicchetti, Rogosch, & Toth, 1998). Cicchetti et al. combined contextual influences in a study comparing depressed and nondepressed mothers. Five instruments operationalized the concepts of parenting hassles, social support, perceived stress, marital support, and family conflict. Scores on the Daily Hassles Scale of Parenting Events, the Interpersonal Support Evaluation List, the Perceived Stress Scale, the Dyadic Adjustment Scale, and the Family Environment Scale were rated as a risk factor if the score was greater than one standard deviation in the direction of indicated risk. Each risk factor was given a +1 score; therefore, the sum of risk factors ranged from 0 to 5.

High contextual risk predicted insecure attachment, as measured by mother sorts of the AQS. Thus, combinations of contextual risk may predict insecure attachment quality.

From a broader perspective, Belsky & Isabella's (1988) study indicated that maternal personality, marital quality, social support, and mother's perceptions of temperament were related to security of attachment. Further analyses combined the effects of maternal personality, marital quality, and perceptions of temperament on the quality of attachment. Scores indicating a positive outcome on each of the three variables were assigned the value "1." For those scores indicating a negative outcome, such as low marital quality or low ego strength in maternal personality, each individual was given the value "0." Thus, each subject could have a combined score from 0 to 3, depending on how they rated on the measures of maternal personality, marital quality, and perception of temperament. Of those subjects with a combined score of three, 92% of the infants were securely attached. Of those subjects with a combined score of zero, only 17% were securely attached.

Belsky & Isabella's (1988) study provides evidence that multiple domains relate to the quality of attachment. These domains include maternal characteristics, child characteristics, and contextual characteristics. The pathways leading to security of attachment are complex indeed; only through examining child development in multiple contexts are we able to obtain a true picture of mother-child attachment.

METHODS

Participants

Participants consisted of 101 mother-toddler dyads either participating in a home visitor program (n = 73) or on the waiting list for the program (n = 28). Sixty-five

percent of the participants were of Latino origin. Countries of origin included Mexico (48%), Guatemala (2%), Brazil (1%), and Peru (1%). Forty-one percent of the mothers spoke only Spanish. Twenty-six percent were non-Latino White, and small numbers of African-Americans (6%), Asians (1%), and Native Americans (2%) were also represented. Sixty percent of the mothers were foreign born. In 54% of the families, there were three or more adults living in the home.

The mean age of mothers participating in the study was 28; the average age of children was 2 years and 11 months (range 12-57 months). Sixty percent of the mothers were married; 32% were single, never-married; 8% were either divorced or separated. Thirty percent of the mothers had an eighth grade education or less; 22% had completed more than 8th grade, but less than a high school education; 31% had completed high school or a GED. Only 4% of the participants were college graduates. The average monthly income of families in the study was $1,113.

Home Visitor Services

The home visitor program served families who were either expecting a child or had children under the age of 6. In order to be eligible for the present study, children had to be between the ages of 1 and 4½ and living with their biological mother. In families with more than one child in the required age range, target children were randomly selected. In order to participate in the program, families had to live within certain zip code areas identified as communities with large numbers of at-risk families. Home visitors recruited families for the program and the waiting list by canvassing zip code areas. Some families were connected to the program through referrals from outside

agencies. Once the home visitors reached their full client loads, interested families were placed on the waiting list for the program.

Families participating in the home visitor program received at least one monthly visit by a paraprofessional home visitor. Home visitors connected families with government and private nonprofit agencies of various kinds. Participants were assisted with transportation, food, clothing, and medical needs. Home visitors also helped with general parenting education and social support.

About a third of the home visitors spoke Spanish fluently. They connected families with English as a Second Language (ESL) classes. While families were learning English, the visitors helped translate for parents in various circumstances. Occasionally, families called on the home visitor to translate when they worked with Child Protective Services or other government agencies.

Procedures

During the first 3 months of the study, a home visitor contacted eligible families from among their clients to see if they would be willing to participate in a study on their next home visitor's appointment. Members of the research team contacted those on the waiting list. If the family agreed, one or two members of the research team, sometimes accompanied by the home visitor, visited the family at home to explain the study and gather data. After working with the agency for a period of time, researchers were given consent to personally contact clients. A subsample (n = 30) from the study indicated that the total amount of time spent in an individual's home ranged from 80 to 390 minutes, with a mean of 138 minutes. The number of appointments required to complete the instruments ranged from one to three with a median of one appointment.

Mothers who agreed to participate in the study signed a consent form. They were reimbursed $10 for their time. At least three tries were made to contact participants. Clients were told that the information would be confidential and that they could refuse to participate. They were informed that the purpose of this survey was to gather data that might improve the home visitor program.

After consent was given, researchers completed a home visit. In completing the Attachment Q-Set, mothers were encouraged to ask questions if they did not understand the items. On occasion, researchers needed to use examples to explain abstract concepts. Researchers offered to read all instruments. We did not record mothers' levels of literacy. Some mothers were illiterate and requested that all of the items be read out loud. Some mothers were able to read with difficulty and requested that some of the measures be read to them. Other mothers asked us to read the measures while they held their babies. In these cases, the mothers may have been illiterate.

Spanish translations were used for the Attachment Q-set, the Parental Involvement and Efficacy measure, and the Parental Stress Index for participants who preferred the Spanish versions. Spanish translators consisting of undergraduate and graduate students assisted in completing the HOME inventory, explaining the Attachment Q-set, and collecting demographic data. In our initial phase of research, home visitors administered the Parental Involvement and Efficacy measure and the Parental Stress Index during their visit with the mother. After we were given permission to contact clients directly, we found it expedient to complete all measures during the home interview.

The participation rate among eligible clients was 83%. Eleven of the clients declined to participate. Four of the clients who agreed to participate did not keep their appointments and could not be reached subsequently. The waiting list participation rate was 50%. None of the families contacted actually refused participation, but 50% of the families were unable to make appointments or made appointments and did not keep them. Follow-up attempts to contact these families were not successful. Forty-six percent of the families on the waiting list were no longer at the same address, or their phones were disconnected. These families, who were never contacted regarding the study, were not included in the participation rate.

Measures

Parenting practices. The Home Observation for the Measurement of the Environment (HOME) inventory examines the intellectual and social environment of the child through direct observation and semistructured interview questions (Caldwell & Bradley, 1984). It was used to measure parenting skills, including warmth and responsiveness of the primary caregiver, and child-related qualities of the physical environment. Many studies have used the HOME as a measure of parenting practices (Okagi & Divecha, 1993). This particular study used subscales from the long form of the infant and preschool HOME.

Each item was scored either yes or no; positively scored items were given one point. These were summed to achieve the subscale and total scores. Questions were worded so that more positive parenting practices received a higher score. We used the infant version for children ages 0-2 years 11 months and the preschool version for children ages 3-6. There are 45 items in the infant version of the HOME inventory, with

5 to 11 items per subscale. Twenty-two of these items are considered observation items, although some of the observation items may be obtained through questioning the parent. For example, one item in the avoidance of restriction and punishment scale is "Family has a pet." If interviewers do not visually see a pet, they ask the family whether or not they have a pet. Another sample observation on this same scale is: "Mother does not shout at child during the visit." The total infant HOME had acceptable internal reliability (alpha = 0.81). There are 55 items in the preschool version, with eight subscales ranging in size from 4 to 11 items. An example of an item on the learning stimulation subscale is "Child is encouraged to learn shapes." An observation item from the physical environment subscale is "The interior of the home is not dark or perceptually monotonous." Cronbach's alpha for the total preschool HOME was 0.74.

One of two researchers completed the HOME measure. Reliability on the HOME was established on three visits before a researcher was allowed to conduct an interview alone. Reliability criteria were met for both the infant and the preschool version of the HOME. Fifteen percent of the visits were checked for reliability between raters.

The following steps describe the procedure for measuring inter-rater agreement. First, individual items were compared across raters to establish agreement or disagreement. The total number of items agreed upon was divided by the total number of items in the applicable version of the HOME. These percentages were then summed and divided by the number of visits checked for reliability to find the average inter-rater agreement (94%). After inter-rater agreement was measured, a consensus was reached through discussion on items that had been scored differently by the raters.

Parental Stress. The Parenting Stress Index (PSI) assesses several different areas to determine the level of stress that the parent experiences in relation to his or her parenting role (Abidin, 1995). This index has been used in clinical samples to measure the probability of child abuse or neglect. In addition, the scale helps identify areas of stress in which the parent lacks coping skills. The long form of the Parenting Stress Index contains 101 items to which parents respond on a 5-point Likert scale ranging from strongly agree to strongly disagree. The short form contains only 36 items. This study used the short form of the PSI with additional items from the long form as required to complete the subscales that measure depression, spousal support, and social support. The index is scored so that a high score indicates greater parenting-related stress. Some sample items from the subscale include: "When playing, my child doesn't often giggle or laugh," and "My child wanders away much more than I expected."

Various subscales of the Parenting Stress Index reflect constructs of interest. The Parental Distress subscale of the short form combines several maternal and contextual characteristics. High scores on this subscale are associated with an impaired sense of parenting competence, restrictions placed on other life roles by parenting, conflict with the father, lack of social support, and the presence of maternal depression. The Parent-Child Dysfunctional Interaction subscale of the short form measures the parent's expectations for the child. High scores on this subscale indicate that the child does not meet the parent's needs. Either the parent feels rejected by the child, or the parent is disappointed by the relationship. The Difficult Child subscale on the short form assesses different areas of child temperament as perceived by the parent as well as the degree of reinforcement that the child gives to the parent. Isolation and Spouse, two

subscales on the long form, relate to the amount of social support available to the parent. Depression, another subscale on the long form, is a measure of maternal depressive symptoms.

Parental Efficacy. The Parental Involvement and Efficacy scale (PIE) describes parental efficacy in the areas of their children's health, social skills, and cognitive development. These items are scored on a five-point Likert scale ranging from strongly disagree to strongly agree. Five of the items are reverse scored. A higher score on the measure indicates a stronger belief in parental efficacy and involvement as well as knowledge about child development. Sample items include: "I can do a lot to help my child be healthy," and "Children need to get ready for kindergarten and learn certain skills."

This 18-item measure was developed specifically for this study. Efficacy in this measure was defined as a parent's belief that a child's learning or behavior was contingent on parental input. A pilot of the PIE was conducted with a group of 93 middle-class parents. Internal reliability was 0.82 in the present study. It was administered by home visitors or research team members to all participating mothers in either Spanish or English.

Attachment Security. Waters and Deane's Attachment Behavior Q-Set (AQS) is an established alternative to the Strange Situation for determining quality of attachment (Vaughn et al., 1992). This instrument includes 90 items. These items are used to assess the quality of the mother-child relationship. Sample items include: "When child is near mother and sees something he wants to play with, he fusses or tries to drag

mother over to it," and "Child readily shares with mother or lets her hold things if she asks to."

Mothers divided the 90 items on cards into three piles of approximately 30 cards indicating which ones were least like their child, somewhat like their child, and most like their child. These three groups of cards were each divided again into three subgroups, resulting in a nine-point Likert scale. The mothers then moved the cards between piles in order to have an equal number in each of the nine piles. This process reduces social desirability bias by forcing mothers to place an equal number of cards on each point of the Likert scale. It also masks the desired construct by including several items unrelated to attachment quality.

The placement of each item by the mother was then correlated with a criterion sort consisting of expert opinion of an ideal sort of the "most secure child." Sixteen developmental psychologists, including Alan Sroufe, Mary Ainsworth, and Mary Main, provided ideal security sorts for children (Waters & Deane, 1985). The reliabilities of composite scores were greater than .95. If the subject was more similar to the hypothetical "most secure child," the mean of the correlations between items was higher. The resulting number ranges from –1 to +1, with +1 representing the most secure attachment possible.

Sorts of this instrument were originally intended to be completed by observers (Waters, 1998). In recent years, mother sorts of the AQS have been used with increasing frequency. Teti and McGourty (1996) compared mother sorts with observer sorts. They found that in those cases where observers did not feel as if they had sufficient information to score the Q-set, observer-sorted scores had a lower correlation

with mother-sorted scores. However, when observers felt somewhat confident or very confident about their sorts, there was no significant difference between group means of the scores between mothers and observers. The mother-observer mean correlation when observers felt very confident about their sorts was 0.73. This study suggests that sometimes mothers have better information than observers in respect to the attachment relationship. In fact, Ainsworth's experience had indicated that infants in the home environment do not always exhibit attachment behavior even when left alone with an observer (Ainsworth et al., 1978). Thus, she developed the Strange Situation procedure to induce attachment behavior.

There are mixed opinions about the use of mother sorts. Waters (1995) recommends observer sorts using 2-6 hours of observation spread over several visits, rather than using mother sorts. Yet, Waters and Deane (1985) reported a mean correlation of .80 between mothers' and observers' sorts in a study of 50 middle-class families. This high correlation was attributed to training of both mothers and observers. Several research studies have indicated expected relationships between mother sorts and such constructs as maternal enjoyment, psychological availability, and security assessed by the Strange Situation (Solomon & George, 1999b). In their review of studies using the Attachment Q-Set, Solomon and George note that increased time of observation tends to increase concordance between mother and observer sorts. As observers have more access to the information that a mother remembers from extensive experiences with her infant, their sorts become more equivalent. From a different perspective, Bretherton (1991) describes the AQS as a tool for measuring a mother's internal working model of the attachment relationship.

The revised version of the Attachment Q-set uses simpler language and is constructed so that social desirability responses are minimized (Waters, Kondo-Ikemura, Posada, & Richters, 1991). The revised version, used in this study, may increase the reliability of mother sorts. A Spanish version of the Q-sort, developed by G. Posada for use with a low-income population in South America, was used with those clients who preferred to communicate in Spanish (Posada, 1999).

RESULTS

The objective of this study was to examine the relationships between maternal and child characteristics, such as maternal depression and child temperament; contextual variables, such as social support; demographics, and attachment quality. Preliminary analyses determined the demographics that would be used as controls in the regression analyses. In addition, an examination of correlations among predictor variables and attachment security provided a preliminary test of hypotheses regarding their relationship to attachment security. Three regressions were conducted to determine the effect of maternal sensitivity, maternal depression, child temperament, spousal support, parental stress, and available play materials on attachment security, controlling for demographic variables. To examine effects of the physical environment, the presence of appropriate toys was tested as a mediator between sensitivity and attachment.

Preliminary Analyses

Preliminary correlations, manovas, and chi-squares were performed to examine whether any of the family demographic variables were associated with maternal and child characteristics, contextual characteristics, and attachment quality. More specifically, we examined the associations of demographic variables with three

subscales from the long form of the Parenting Stress Index (PSI) measuring depression, spousal support, and social support. We also compared demographic variables with attachment security (Attachment Q-Set) and parental efficacy (Parental Involvement and Efficacy).

Of maternal demographic characteristics, only Latino ethnicity and maternal education were significantly correlated with any study variables. Maternal education was significantly related to six of the predictor variables (See Table 2). Latino mothers were compared with mothers from other ethnic groups. The mothers who were not Latino were mostly non-Latino White. Other ethnic minorities were represented in small numbers (1% to 7%); therefore, it was not possible to include Asian, African-American, Native American, and Pacific Islander ethnicities in our analyses. Latino ethnicity was significantly related to the depression subscale of the Parenting Stress Index (F (1, 89) = 7.80, $p < .01$), with non-Latino mothers exhibiting less depression. Other multivariate analyses of variance used maternal characteristics as the between subjects factor. In these analyses, there were no effects of employment of mother, presence of spouse or partner, or foreign country of nativity on predictor variables or attachment security. Bivariate correlations between maternal age and study variables did not indicate any significant relationships.

Correlations between the number of children in the household and predictor and outcome variables were not significant. In addition, child age was not related to any study variables. A multivariate analysis of variance indicated that child gender was not related to predictor variables or attachment security. Correlations of income with study variables indicated no significant relationships.

Given that the home visitor program helped families with basic living needs and did not focus on parenting, we did not expect the intervention and waiting list groups to differ. However, in order to test for such differences, a series of multivariate analyses of covariance (MANCOVAs) were conducted with intervention program as the between subjects variable. Since the waiting list participants were less educated than participants in the intervention program, education was included as a control variable in these analyses. These analyses indicated no significant differences between the groups on attachment security or predictor variables. Thus, all further analyses combined the two groups of participants.

Bivariate Correlations

The next set of analyses examined intercorrelations among predictor and outcome variables. In order to utilize data from the preschool and infant versions of the HOME across the entire sample, two subscales were converted to z scores (calculated from data in the study sample). A collaborative study headed by Bradley and Caldwell, the authors of the HOME scale, also combined these two subscales using z scores (Bradley et al., 1989).

First, Emotional Responsivity from the Infant version and Pride, Affection, and Warmth from the Preschool version were combined to measure maternal sensitivity. These two subscales were combined because four of the seven items on the Preschool Pride, Affection, and Warmth scale were duplicated in the Infant version of the sensitivity scale. Other items on the scale reflect the same construct but are adapted to be developmentally appropriate. Second, play materials from the Infant version and toys and materials from the Preschool version were considered equivalent. Although the

specific types of toys were different across the two versions due to the changing nature of a child's development over time, the constructs were fairly identical.

Table 2 presents intercorrelations of study variables across all age groups. This table reveals 22 out of 36 significant correlations among predictor variables. Correlations with two subscales of the short form of the Parenting Stress Index, parental domain and dysfunctional interaction, and correlations with the total scale of the short form Parenting Stress Index (PSI) are reported below. Our study used subscales from both the short form and the long form of the PSI. Two subscales from the short form and the total scale from the short form contained duplicate items with subscales of the long form. Correlations among these short form scales and other subscales of the long form PSI would be meaningless due to the duplication of items. Thus, correlations with personal domain, dysfunctional interaction, and total stress were not included in the grid of intercorrelations (Table 2).

The following results were obtained from correlations with two subscales of the short form Parenting Stress Index, dysfunctional interaction and parent domain, and the total short form PSI. Mothers with higher personal stress, as defined by the parent domain subscale, had less secure attachments (r = -.32, p < .01), less sensitivity (r = -.25, p < .05), and less education (r = -.45, p < .001). Mothers who reported more dysfunctional interaction with their child had lower self-efficacy ($\underline{r}$ = -.24, $\underline{p}$ < .05), less secure attachments ($\underline{r}$ = -.31, $\underline{p}$ < .01), less sensitivity (r = -.40, p < .001), and less education ($\underline{r}$ = -.43, $\underline{p}$ < .001). The total short form score of the Parenting Stress Index was significantly related to attachment security (r = -.42, p < .001) and maternal variables, including sensitivity (r = -.39, $\underline{p}$ < .001), parental efficacy (r = -.25, p < .05),

and education ($r = -.62$, $p < .001$). In addition, total stress was inversely related to play materials ($r = -.24$, $p < .05$).

Several patterns emerged from the results of the correlations. As predicted, greater maternal sensitivity was associated with greater attachment security. Greater maternal depression and higher levels of difficult child temperament were related to lower levels of attachment security. Greater spousal support was related to lower levels of maternal depression and higher levels of maternal sensitivity.

Regression Analyses

The next set of analyses examined the joint contributions of demographic variables, and maternal, child, and contextual characteristics to attachment security using a sequential regression model. The final set of predictors for the regression model was chosen on the basis of preliminary analyses, such as significant bivariate correlations. Order of entry was determined by a priori conceptualization.

Model 1 entered maternal characteristics, including Z-scores of sensitivity, education, depression, and efficacy. Parental efficacy and depression were significant predictors of attachment security. Model 2 added an independent variable that is occasionally related to attachment, difficult child temperament. This addition to the model was not significant.

Model 3 added the Z-score of the HOME subscale, provision of appropriate play materials, an aspect of the physical environment. The physical environment is not generally considered to be associated with attachment quality; however, bivariate correlations suggested that this aspect of the home environment was highly correlated

with attachment. The effect of play materials on attachment security was a significant addition to the model.

Toys as a Mediator

Four criteria must be met before a variable can be considered a mediator (Baron & Kenny, 1986). First, the mediator and the predictor variable must be significantly related. Second, the predictor variable must be significantly related to the outcome variable. Third, when the outcome variable is regressed upon both the predictor variable and the mediator, the relation between the predictor variable and the outcome variable must be less than that obtained in a bivariate correlation. Fourth, the mediator must be a significant predictor of the outcome variable in the multivariate regression.

Play materials was a significant mediator of the relationship between maternal sensitivity and attachment security. The four criteria were tested as follows. Bivariate correlations indicated that the predictor variable, sensitivity, was significantly related to the mediator, play materials ($r = .28, p < .05$). In addition, sensitivity was related to the outcome variable, attachment security ($r = .29, p < .01$). When sensitivity and play materials were entered in a regression with attachment security as the outcome variable, the correlation between sensitivity and attachment security was significantly reduced (F-change = 13.27, $p < .0005$). Finally, play materials was a significant predictor of attachment security in a multivariate regression (See Table 3). If play materials had been entered as the initial predictor variable with demographic variables, the significance of sensitivity as a predictor of attachment would not have been apparent in the regressions.

DISCUSSION

The current study assessed the contributions of maternal, child, and contextual factors to attachment security in a sample of mothers and children in a family support program or on the waiting list for the program. As demonstrated in the literature review, research indicates that specific risk factors, such as maternal sensitivity, have been identified as predictors of insecure attachment. Early research tended to focus on the caregiver's behavior toward the child, overlooking other physical and contextual aspects of the child's environment (Wohlwill & Heft, 1987). Inclusion of broader aspects of the child's environment makes it easier to understand the relationship of the physical environment, the social environment, and contextual factors to attachment security.

In this study, lower levels of maternal sensitivity, difficult child temperament, parental stress, and an inadequate supply of play materials in the home were related to lower levels of attachment security. The provision of play materials in the home mediated the relationship between maternal sensitivity and attachment security.

Maternal Characteristics

The first domain that will be discussed is that of maternal characteristics. As predicted by the hypotheses, maternal depression was related to lower levels of attachment security. Depressed mothers tend to withdraw from their children (Murray et al., 1996). Lack of involvement in their children's development inhibits the formation of secure attachments. In this study, depressed mothers were less sensitive to their children and tended to have insecure attachment relationships.

The direct relationship between maternal sensitivity and attachment was also predicted by the hypotheses. Greater maternal sensitivity was significantly related to higher levels of attachment security. In addition, mothers who were observed to be

sensitive self-reported fewer dysfunctional interactions with their child. This relationship between sensitivity and attachment is in accordance with attachment theory (Isabella, 1999). Responsive mothers develop patterns of behavior with their infant that teach the infant to trust in the mother. Mothers who do not respond to their infant are more likely to develop dysfunctional patterns of mother-child interaction. By responding to the infant's cues, such as crying, with prompt and appropriate behavior, the mother helps the infant to feel secure. Thus, the child is able to use the mother as a secure base from which the child explores the environment.

An interesting point revealed by this study lies in the effect of control variables on the relationship between maternal sensitivity and attachment. When maternal education was included in a regression on attachment security, maternal sensitivity was no longer significant. The addition of parental stress and play materials reduced the relationship between sensitivity and attachment further.

Perhaps the environmental conditions of poverty supersede the effect of sensitivity and attachment. For example, if a mother lives in stressful conditions, with few toys for her infant and no opportunities for self-improvement, these conditions may override the impact of her sensitive behavior on attachment security. According to De Wolff and van IJzendoorn (1997), orthodox attachment theory indicates that the status of the sample (e.g. low-income vs. middle class) should have no effect on the relationship between maternal sensitivity and attachment security. Yet, the results of their meta-analysis indicate that more severely clinical samples have lower correlations between sensitivity and attachment than mildly clinical samples.

This study also points to further research in the area of parental beliefs and attachment. In this study, parents who believed that involvement with their children was an effective method for enhancing their children's development were more likely to be securely attached. Although studies have discussed the theoretical basis for a relationship between parental efficacy and attachment (e.g., Olds, 1997), few studies have demonstrated a clear relationship between attachment security and parental efficacy. An exception is research involving clinically depressed mothers (Teti & Gelfand, 1991). Self-competence measures of parental efficacy among wider samples have had conflicting results (del Carmen, Pedersen, Huffman & Bryan, 1993; Spieker & Booth, 1988). Other researchers have noted the varied definitions and operationalizations of parental efficacy (Lovejoy, Verday & Hays, 1997). Future research involving more than one definition of parental efficacy may clarify these relationships.

In this sample, the average Latino mother had received nine years of formal education. Eighteen percent of the total sample had not received any education past elementary school. Although we did not measure illiteracy, mothers with little formal education would be more likely to struggle with reading and comprehending what they have read. These problems would be compounded among those who were trying to read in a second language. Such low levels of education could create additional stress; in fact, lower education levels were associated with higher parental stress. The uniqueness of this sample may show stronger effects for maternal education than might be found in a sample of middle-class mothers, with uniformly higher levels of education.

Although higher levels of education were significantly related to greater attachment security, education was not a significant predictor of attachment in the final regression models. The relation of education to attachment security and other predictor variables leads to speculation about possible indirect effects. Education may have impacted the process of attachment by increasing the perception of parental efficacy or by minimizing the likelihood of depression. In this sample, higher education was related to higher levels of parental efficacy and lower levels of depression.

Child Characteristics

As predicted by the hypotheses, mother's perception of difficult child temperament was related to lower levels of attachment security. Few studies have found a direct relationship between temperament and attachment. Yet, when we added temperament to the model including other predictor variables, the effect of temperament on attachment was not significant. Thus, the apparent correlation between mother's reports of difficult child temperament and attachment was accounted for by a combination of other variables. Less maternal education, lower parental efficacy, less social support, less spousal support, greater maternal depression, and lower levels of emotional sensitivity were all associated with more difficult child temperament. This suggests that difficult child temperament may be increased by negative experiences with the mother. For example, if a mother is not attentive or responsive to her infant's cues at the age of three months, the child is likely to be fussier (Susman-Stillman, Kalkoske, Egeland, & Waldman, 1996).

While temperament was associated with attachment, it is likely that temperament was influenced by other factors that were also related to attachment, such as maternal

sensitivity. It is also possible that a mother who perceives her child as being fussier than other children may be less sensitive to her child's needs. Another alternative hypothesis is that mothers with personal stress tend to rate their children as more difficult in temperament; they are also less likely to be emotionally responsive or to have children with secure attachments.

In this study, mothers who had children with more difficult temperaments were less emotionally responsive. Unresponsive mothers may behave in ways that tend to make their children exhibit characteristics of difficult temperament, such as frequent crying. Whether difficult children elicit unresponsive parenting, or whether unresponsive parenting makes children fussier is difficult to tell from this study. The relationship between sensitivity and temperament may be reciprocal in nature (Belsky, Fish, & Isabella, 1991).

Mothers with lower levels of parental self-efficacy also tended to report that their children had difficult temperaments. It may be that caregiving would be more frustrating for mothers who did not believe that their efforts were effective. Thus, mothers with this belief may tend to perceive their children as more difficult. An alternative hypothesis is that mothers with difficult children might feel less effective as parents, leading them to believe that their child's development is not affected by their efforts.

Contextual Factors

Stress is a factor that has been hypothesized to disrupt the mother-child relationship (Wachs & Camli, 1991). As predicted by our hypotheses, more stress was significantly related to lower attachment security in this study in both direct correlations

and in a regression equation. Other research supports this finding (Hadadian & Merbler, 1996; Jarvis & Creasey, 1991; Pederson et al., 1990; Teti et al., 1991). In addition, there were some effects of program participation on measures of maternal stress. Mothers who had been in the program longer were less likely to have dysfunctional interactions with their child that create stress and less likely to perceive their child as having a difficult temperament.

In general, stress and maternal depression are associated with low family incomes (Lyons-Ruth, 1992b). Contrary to our hypotheses, there were few study variables associated with income level. Low variance in income in this predominantly low-income sample may have accounted for the lack of significance of income in relation to other study variables. There was, however, a tendency for families with less income to provide fewer playthings for their infants. Although a few previous studies have investigated the effect of multiple risk factors on attachment in low-income families (Spieker & Booth, 1988, Lyons-Ruth, 1992a), none have investigated the facilitation of attachment through the provision of playthings.

Of importance is the finding that the provision of appropriate toys acted as a buffer on the relationship between sensitivity and attachment security in this study. For example, mothers who lacked sensitivity tended to have children who were insecurely attached. However, if these mothers provided adequate play materials, this reduced the negative effect of their low sensitivity on attachment security. On the other hand, an inadequate supply of playthings reduced the positive effect of a highly responsive mother on the security of mother-child attachment.

In visiting the homes of families in this study, it was apparent that some families managed to obtain play materials for their children in spite of their extremely low income. For example, one family had obtained several plastic cups from a fast-food restaurant that they used as a stacking toy. Yet, thirty percent of the homes did not report having toys that taught their infants about colors, sizes, and shapes. Such items may be readily available, but the parents did not report using objects to teach these concepts. Thus, to some extent, characteristics of the parents may influence the physical environment. In fact, data from this study indicates that maternal sensitivity and the provision of appropriate toys are related.

It is also important to remember that many families had serious deficiencies in supplies of basic needs, such as food, clothing, and household goods. The supply of toys that existed in this sample could not be compared to the supply of toys in middle class homes. Fifteen percent of the homes did not have crayons or other art supplies available for their preschoolers. There may be certain deficiencies in low-income children's environments that cannot be easily replaced by concerned parents.

In summary, this study supports the validity of Belsky's model of the determinants of parenting (1984). High levels of spouse support, low levels of maternal depression, and low levels of parenting-related stress were associated with security of attachment. We did not anticipate, however, that the effect of maternal sensitivity would not be significant in multivariate regressions. It appears that the influence of maternal sensitivity on attachment is reduced by other factors, (e.g., demographic variables, maternal depression, stress, and play materials) that share common variance with sensitivity. In this sample, other factors besides maternal sensitivity determine the

security of mother-child attachment. Yet, it is possible that a better measure of attachment security, such as the Strange Situation Procedure, or a better measure of maternal sensitivity, such as coded videotapes of maternal behavior, would have yielded different results.

Limitations and Strengths of the Study

It would be useful to replicate the present findings with longitudinal data in order to further investigate models of attachment predictors. This would cast light on the temporal ordering of events. A longitudinal design is also necessary to draw conclusions regarding causality. Some relationships, such as temperament and sensitivity, may reflect a reciprocal process. More complex analytic procedures, such as path analysis, and multiple measurements over time are necessary to fully capture the process of attachment formation.

A second limitation of the study is that mother reports of attachment quality and mother reports of parental stress, depression, social support, and parental efficacy are not independent. However, the use of independent observers for the measure of emotional responsivity adds validity to the study. These observers were blind to both the Parental Stress Index and the Attachment Q-Set scores.

Other researchers have cautioned against the use of mother sorts of the Attachment Q-set in low educated samples (Teti et al., 1991). One other research study, however, has used mother sorts with an at-risk population (Hadadian & Merbler, 1996). Their results were consistent with attachment theory, indicating that mother sorts of the attachment q-set may be valid measures of attachment security even in a low-income population. However, test-retest reliability of mother sorts in a low-income sample may

further validate mother sorts of this instrument among mothers with little education. Comparison with results of the Strange Situation Procedure would also be useful.

Finally, results of the study related to the Parental Involvement and Efficacy measure warrant further examination. It may be useful to administer this measure during the prenatal period to determine directional effects. This measure of global parenting-related efficacy could be contrasted with another measure of personal parenting competence. Comparison of these measures with results of the Strange Situation Procedure may further our understanding of the relationship between various definitions of parental efficacy and avoidant, secure, resistant and disorganized types of attachment.

In addition, this study could be used to inform further interventions among at-risk families. It is possible that low parental efficacy could be improved by parenting classes or other forms of parental education. The importance of the provision of children's toys in relationship to attachment could also be useful in designing intervention programs for families in poverty.

In order to implement such programs successfully, it would be useful to research what types of toys are important to children's attachment. Toys that act as surrogates for the mother figure, such as a security blanket or stuffed animal, may assist in the development of attachment. An alternative hypothesis would be that toys are necessary objects for appropriate mother-child play, and it is the interactive play that enhances attachment security.

In summary, findings indicate that maternal characteristics, child characteristics, and contextual factors have an impact on attachment security in this at-risk sample. The presence of multiple risks in these families, such as maternal depression, stress, and low

maternal education, makes it possible to examine extremes of children's home environments. Thus, it is possible, to some extent, to gain further understanding regarding the relationship between various aspects of children's environments and attachment security.

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Table 1.

Descriptive Statistics on Attachment Security and Maternal, Child and Contextual Variables

Variable	Mean	Standard Deviation	Range
Attachment Security	.32	.20	-.10 - .67
Maternal Characteristics:			
Education	9.83	3.25	0 - 15
Efficacy (mean item score)	4.22	.52	1.89 – 5.00
Depression	21.46	6.24	9 - 40
Stress (short form PSI)	82.78	20.73	45 - 150
Sensitivity			
Infant Version	7.76	2.37	1 - 11
Preschool Version	4.54	2.17	0 - 7
Child Characteristics:			
Difficult Temperament	30.46	6.62	15 - 47
Contextual Characteristics:			
Toys			
Infant Version	6.19	2.32	2 - 9
Preschool Version	6.74	2.08	0 - 11

Table 2.

Intercorrelations of study variables

Variable	2	3	4	5	6	7	8	9
1. Attachment	--	.30**	.33***	-.37***	.28**	-.17	-.04	-.33**	.43***
2. Maternal education		--	.26**	-.41***	.16	-.30**	-.19	-.38***	.44***
3. Maternal efficacy			--	-.20	.14	-.04	-.05	-.17	.31**
4. Maternal depression				--	-.26*	.51***	.38***	.57***	-.19
5. Maternal sensitivity					--	-.09	-.25*	-.25*	.24*
6. Isolation						--	.60***	.39***	-.02
7. Low spousal support							--	.20*	-.05
8. Child difficult temperament								--	-.17
9. Appropriate toys									--

Table 3.

Nested regression models on attachment security

Beta values for variables

Entered Variables	Model 1	Model 2	Model 3
Maternal Characteristics:			
Maternal education	.13	.11	.03
Maternal depression	-.23*	-.18	-.19
Parental efficacy	.24*	.24*	.21*
Sensitivity	.15	.15	.11
Child Characteristics:			
Difficult child temperament		-.12	-.13
Contextual Characteristics:			
Toys			.21*
Degrees of freedom	4	5	6
F-change	---	1.01	4.15*
Adjusted R-square	.21***	.21***	.24***

N = 87 * p < .05, ** p < .01, *** p < .001

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